Engineer Problem-Solving Syllabus (2025)

1. Computer Networking (Very Important)

- • OSI Model & TCP/IP
- • DNS, HTTP/HTTPS
- • Caching (Browser cache, CDN)
- • SSL/TLS, Handshake Process
- • Load Balancer, Proxy Server
- • Latency, Throughput, Bottlenecks

2. Operating System Concepts

- • Process vs Thread
- • Scheduling Algorithms
- • Deadlock, Concurrency
- • Memory Management (Paging, Virtual Memory)
- • File Systems

3. Database Design & Optimization

- • SQL vs NoSQL
- • Indexing, Joins, Normalization
- • Query Optimization
- • CAP Theorem
- • ACID & BASE properties

4. System Design (Start from Basics)

- • Monolithic vs Microservices
- • High-level design of: Chat App, URL Shortener, E-commerce System
- • Load Balancer, API Gateway
- • Scalability (Vertical vs Horizontal)
- • Caching Strategies (Redis, Memcached)

5. Backend Deep Dive

- • REST APIs & GraphQL
- • Authentication: JWT, OAuth, Session
- • Rate Limiting
- • File Uploads, Streaming
- • WebSockets (Real-time messaging)

6. DevOps & Deployment

- • Docker, Docker Compose
- • CI/CD Basics (GitHub Actions)

- • Nginx, PM2
- • Monitoring Tools: Prometheus, Grafana
- • Error Logging: Sentry

7. Security Basics

- • HTTPS & SSL
- • XSS, CSRF, SQL Injection
- • Authentication vs Authorization
- • Hashing (bcrypt, salting)

8. Cloud Fundamentals (Optional but Great)

- • AWS Basics: EC2, S3, RDS
- • Cloud Architecture
- • Serverless Concepts

Bonus: Real-World Project Challenges

- • Handle 10k+ concurrent users
- • Design fault-tolerant system
- • Detect and solve server bottlenecks
- • Offline first applications (PWA)
- • Build for low-network conditions